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## Battery Consideration for Pulse Operated Cameras

In the use of electrically pulse operated cameras, one of the questions that frequently arises is the optimum power pack that will satisfy both the mission reliability requirements and the flexibility requirements. The purpose of this report is to explore the power pack capability requirements and to give recommendations as to the choices of power packs.

Prior to determining the battery capacity requirements, it is necessary first to determine the mission duration. The mission duration is a function of the film magazine capacity and the rate of activity. The last factor has to be estimated based on previous experiences. Figure 1 shows the relationships between these variables. For example a 100 ft. magazine will last 12 days for a relatively moderate activity of 100 frames per day. For a very active situation, that is at 1000 frames per day, a 1000 ft. magazine is required for the same mission duration.

Having reviewed the mission duration, one can discuss the battery requirement more intelligently. The camera power drain can be divided into two parts, steady power drain and pulsed power drain. The automatic electronic command switch and the exposure control system belong in the steady drain category, although it is possible to design a circuit which will transfer the exposure control system to a pulse operated case.

The film transport power drain is a discontinuous drain. Its value is a function of the activity rate and the motor current. Figure 2 shows the continuous and non-continuous power drain on the power pack. One obvious point from this figure is that the continuous power drain is much greater.

From the above two figures the following conclusions can be drawn:

1. For both long and short duration missions the power drain is due to the electronic equipment.
2. The average power drain rate is very low, .003 - .006 amp.

The following recommendations are based on these two conclusions:

1. For short mission duration and small magazine (100 ft.) use integrated magazine and battery pack as per Figure 3. (Two .5 amp. hr. batteries in parallel.)
2. For long mission durations use 2 4AH nickel cadmium batteries.
3. Alternately, the same battery as one used for the short mission case but with a sun battery for charging.

Attached is some of the literature on solar batteries.